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NEOCORYNURA ELECTRA, A NEW FOSSIL BEE SPECIES FROM DOMINICAN AMBER (HYMENOPTERA: HALICTIDAE)

MICHAEL S. ENGEL

Department of Entomology, Comstock Hall, Cornell University,
Ithaca, New York 14853

Abstract.—A new fossil bee species, *Neocorynura electra,* is described and figured. The species is known from one female in the Upper Oligocene or Lower Miocene amber deposits of the Dominican Republic. No species of *Neocorynura* are known to occur in the Greater Antilles today. This is only the fourth halictid species known from amber inclusions. A brief discussion of augochlorine biogeography in the Caribbean is presented.

Key words: Augochlorini, Dominican amber, fossil bee, Halictidae, *Neocorynura.*

One group of bees can be quite common in Dominican amber, i.e., the stingless bees (Apidae: Meliponini), which are abundant to the extent that specimens can be readily purchased in gem shops. Fossils of the bee family Halictidae, however, are uncommon. Engel (1996) recently reviewed the described fossil halictid species of the world and listed only nine taxa, four of which were from Dominican amber inclusions. As noted by Engel (1996), the rarity of halictids in amber is probably due to the fact that most species nest in the soil and do not collect tree resins, thus making it unlikely for them to come into contact with sap. Some species of the augochlorine genus *Neocorynura* are known to nest in wood (Schremmer, 1979), and although this is not universal for the genus (Michener, 1977; Michener and Lange, 1958; Michener et al., 1966; Sakagami and Moure, 1967), it would make this group more likely than other halictid taxa to be preserved in amber. The specimen described herein is representative of this genus and was listed as "*Neocorynura* sp." in Engel's summary of fossil Halictidae (1996: his table 1).

The *Neocorynura* species described below is from the amber mines of the Dominican Republic. These mines are estimated to be approximately 30 million years old (Lower Miocene to Upper Oligocene) based on stratigraphic evidence (Grimaldi, 1995). Lambert et al. (1985) determined a broad range of ages for Dominican amber (15–40 million years; Mid Miocene to Upper Eocene), but Grimaldi (1995) has critiqued their NMR estimates for amber ages. Aside from the stratigraphic data, the faunal representation of bees in the Dominican deposits also argues for a younger age than the potentially Eocene age suggested by Lambert et al. (1985). The Dominican amber bee fauna is more similar to today's fauna than the 40 million year old Baltic amber fauna, suggestive of a much younger age. All of the Dominican amber bees (see review in Michener and Poinar, 1996) are assignable to modern genera or to extinct genera close to present day forms (e.g., *Oligochlora*). Baltic amber bees such as *Electrapis, Glyptapis,* or *Chalcobombus,* however, are radically different from modern taxa and their assignment even to higher groups is questionable.

Neocorynura (Neocorynura) electra, new species
Figs. 1–4

Description: Based on a single female specimen. Total body length 7 mm; total forewing length 4.9 mm; head width 1.68 mm; head length 1.28 mm; scape length 0.84 mm; intertegular distance 1.36 mm. All measurements were made with an ocular micrometer on a WILD-M5a microscope and are approximate as the best angle for taking readings was often not possible due to the uneven surface of the amber.

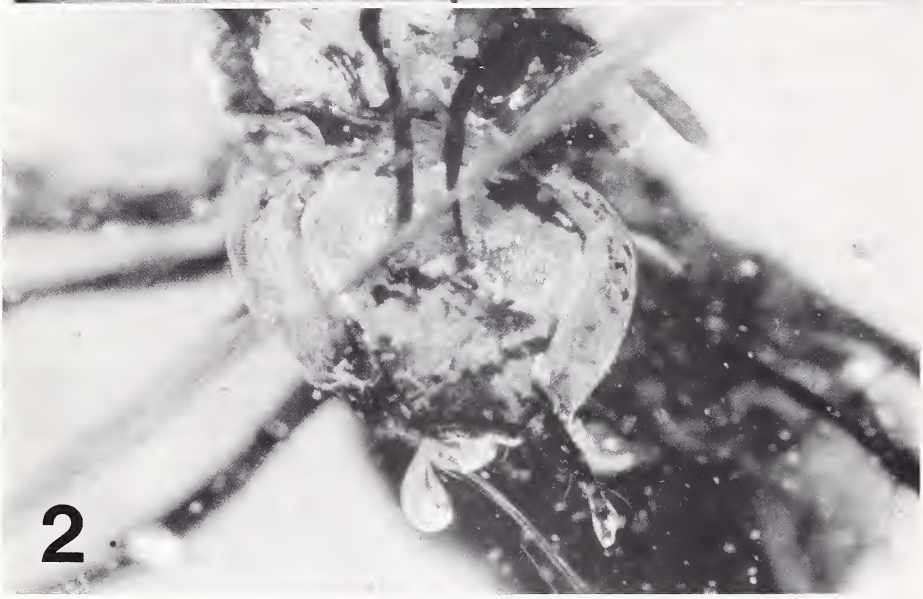
Head slightly wider than long (Fig. 2). Angle of epistomal sulcus obtuse, as measured between lateral clypeo-genal sulcus and dorsal clypeo-genal sulcus with angle opening towards the compound eye (*sensu* Eickwort, 1969). Clypeus and supraclypeal area not protuberant, gently rounded and low. Mandible monodentate, slender; subapical tooth very weak; distal half of clypeus extending beyond lower tangent of compound eyes. Labrum and labio-maxillary complex not visible. Frontal line short, carinate between antennae, disappearing just above the antennal sockets. Compound eyes strongly emarginate and convergent below. Ocelli not enlarged, closer to one another than to compound eyes. Antenna below line of eye emargination; scape long; pedicel slightly shorter than first flagellomere; flagellomere I constricted basally, longer than wide, seemingly slightly longer than II; II–VII not easily visible, seemingly about as wide as long from II–V, then VI–VIII becoming slightly longer than wide; IX slightly longer than wide; distal flagellomere twice as long as wide. Vertex short. Gena difficult to see due to curvature of the amber surface, however seemingly narrower than compound eye. Preoccipital ridge not easily visible, presumably carinate. Pronotal lateral angle orthogonal, slightly produced and sharp; ridge between lateral angles carinate; dorsal and lateral ridges carinate. Pronotal lobe moderately produced to form a blunt tubercle. Mesoscutum narrowed anteriorly and projecting over pronotum; mesoscutal lip high and rounded. Median and parapsidal lines moderately impressed. Tegula normally rounded; smooth with short, simple setae on anterolateral margin. Scutellum and metanotum not visible from above due to curvature of amber, both seemingly gently convex when viewed from anterior or posterior. Propodeal triangle seemingly short, longer than metanotum but not longer than scutellum (estimated). Propodeal dorsal and lateral ridges rounded, lateral ridges slightly divergent; propodeal pit narrow; propodeum narrowed posteriorly. Legs slender; anterior basitarsal brush present and weak; protrochanter three times longer than wide; mesotrochanter twice as long as wide; mesotibial spine over half as long as mesotibia (Fig. 1); metatrochanter about as long as wide; metatibia swollen posteriorly. Basitibial plate not visible. Inner hind tibial spur pectinate, all teeth long; three teeth on right leg (not including the apex as a tooth); left leg with four teeth, first and third teeth shorter than second and fourth (Fig. 4). Wings hyaline; basal vein slightly distad of cu-v crossvein; first submarginal cell either equal to or just slightly longer than second and third combined (difficult to see due to wing folding); second submarginal cell not narrowed anteriorly; third submarginal cell roughly equal to second in length (along a median axis running basad to distad); anterior border of second submarginal cell along Rs longer than that of the third submarginal cell (Fig. 3). Marginal cell very broad basally and tapering to acute apex (Fig. 3). 2r-m slightly distad of 2m-cu, offset by about the width of a vein; 1r-m apparently

confluent with 1m-cu (difficult to see due to folding of wing along this region). All veins and stigma, black and strong.

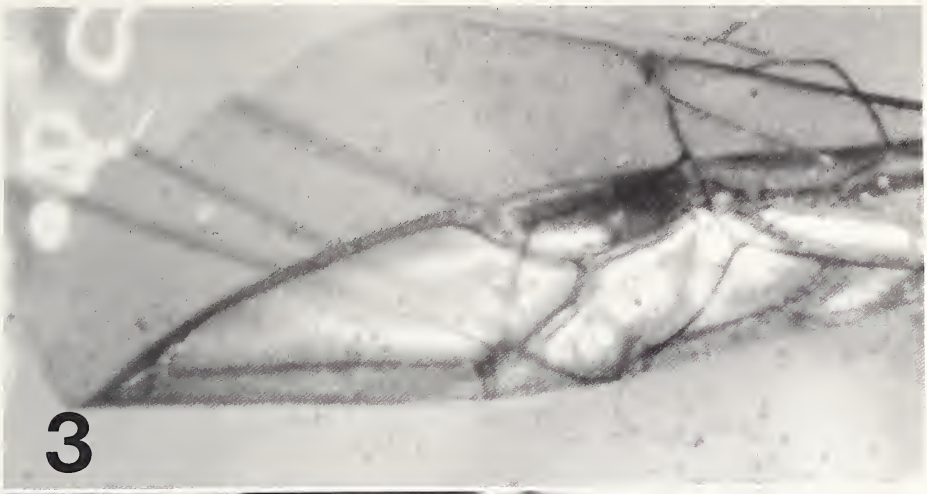
Integument of head and thorax brilliant metallic gold-green, except as indicated below and where presumably damaged by preservation. Clypeus and supraclypeal area finely granular with few scattered large granules. Distal margin of clypeus black and with few weak punctures. Remainder of face closely punctate, punctures separated by less than puncture width; integument between punctures finely granular. Punctures towards vertex becoming slightly smaller, but still close. Antenna black. Pronotum dark brown to black with metallic green highlights, lateral surfaces smooth and colored as on face. Mesoscutum closely punctate as head. Tegula light brown and semi-transluscent, posterior border darker brown. Scutellum and metanotum apparently sculptured as mesoscutum. Pleura roughened and closely punctate, except metepisternum which is finely granular. Propodeal triangle finely granular with short, weak striations along anterior margin (difficult to see). Propodeal dorsal and lateral surfaces imbricate or very finely granulose, impunctate. Legs dark brown to black with strong metallic green highlights. Metasoma dark green, generally impunctate. Tergum III apparently with very fine punctations basally and green color more apparent basally than on remainder of tergum. Sterna seemingly with same color and sculpturing as terga.

Face without pubescence, except a few simple, moderate length setae along distal margin of clypeus. Vertex with a few short, simple hairs. Pronotum and mesoscutum without visible pubescence. Scutellum and metanotum with numerous long hairs, some with short branches. Pleura with few scattered short to moderate length hairs. Propodeal dorsal and lateral surfaces with widely scattered hairs, all of moderate length. Scopa formed of long plumose hairs scattered on metafemur, on distal end of metatrochanter, and surrounding inner face of metatibia, those of tibia denser than on trochanter or femur; anterior and posterior faces of metatibia with stiff, simple hairs; similar hairs on basitarsus. Tergum I with moderately long, simple hairs on anterior face, remainder of tergum with few scattered short, simple hairs; hairs more numerous and longer on lateral margins. Terga II–V same as posterior half of tergum I. Sterna with hairs more numerous and longer than those on terga, hairs dispersed over entire surface and not concentrated on margins.

Preservation: The holotype specimen is wonderfully preserved, there being no destruction of the features by "Schimmel" (a whitish mold sometimes present on amber inclusions), and although there appears to be some very mild compression of the legs and head, none of it has obliterated any of the characteristics of the bee. The bee is folded at the waist such that the tip of the metasoma faces anteriorly (Fig. 1). The three right legs are stretched out away from the body and into the amber, while those of the left are positioned along the metasoma and beside the extended sting. A fracture plane runs through the amber, not fracturing the bee, across the head and back to the mesothorax (Figs. 1 and 2). The wings are folded or slightly crumpled, but extending away from the body posteriorly at an oblique angle to the line of the thorax (Fig. 1). Numerous small pollen grains are present in the scopa and scattered about the body in the amber (Fig. 1). The pollen has not been identified. A few small air bubbles are present in the amber near the specimen (e.g., a small bubble at apex of the clypeus in Fig. 2), but do not obscure the bee



Figs. 1–2. *Neocorynura electra* n. sp., holotype female. 1. Anterior view of bee's position in the amber and the fracture plane running across the bee. The mesotibial spine can be seen extending off of the right (left in the photo) mid-leg and appears somewhat foreshortened. The minute particles running from the lower right corner diagonally to the upper left are pollen grains (photo by D. A. Grimaldi, AMNH). 2. Enlarged view of the bee's face (photo by MSE).



Figs. 3–4. *Neocorynura electra* n. sp., holotype female. 3. Marginal cell of right forewing (photo by MSE). 4. Inner hind tibial spur of left leg (photo by D. A. Grimaldi, AMNH).

in any very significant way. Only the curvature of the amber obscures a clear view of some structures (e.g., the mesosoma as seen from above).

Holotype Female: Oligo-Miocene Dominican amber, deposited in the American Museum of Natural History.

Etymology: The specific name is derived from the Latin word *electrum*, meaning "amber."

Comments: *N. electra* can be easily separated from the other two amber augochlorines of the genus *Oligochlora*. *Oligochlora* lacks the anteriorly narrowed mesoscutum and distinctly carinate pronotal dorsal ridge present in *Neocorynura*. Aside from the generic characteristics, the acute marginal cell apex (Fig. 3), broad marginal cell base (Fig. 3), and sharp pronotal lateral angle can separate *N. electra* from both *Oligochlora eickworti* and *O. micheneri*. Additionally, both species of *Oligochlora* are fairly robust bees while *N. electra* is rather slender, resembling in this respect another amber halictine, *Eickwortapis dominicana* (Michener and Poinar, 1996). *Eickwortapis*, however, lacks a preoccipital carina and the anteriorly narrowed mesoscutum. This latter genus is likely to belong in the tribe Halictini, in which case the usual augochlorine characters would also differentiate *N. electra* from it, but tribal assignment of *Eickwortapis* has remained difficult due to an inability to adequately examine the female fifth tergum and the male seventh tergum in *E. dominicana* (see Michener and Poinar, 1996).

REMARKS

This is the fourth amber halictid species currently known, and the third from the tribe Augochlorini. As previously discussed by Engel (1996), the fossil augochlorines do little in helping to determine the overall age of the tribe as both *Neocorynura* and *Oligochlora* are not basal taxa.

No species of *Neocorynura* are known to occur in the Greater Antilles today (Moure and Hurd, 1987), although I have seen specimens of an unnamed species from St. Vincent and Trinidad (also noted by Eickwort, 1988; these specimens are in the National Museum of Natural History, Smithsonian Institution). The species from the Lesser Antilles is similar to *N. electra*, differing in the degree to which the pronotal lobe is produced, the width of the marginal cell, sculpturing of the propodeal triangle and metasoma, and overall body coloration. The extant species of *Neocorynura* are in need of taxonomic work and until such a study has been undertaken it is difficult to say whether *N. electra* is sister to the Lesser Antillean species and whether together they support a South American derivation of the West Indian augochlorine fauna. Given that no *Neocorynura* occur further North than Mexico, that the Mexican species available to me do not seem closely related to *N. electra*, and the restricted presence of the genus to the Lesser Antilles today, it seems unlikely that the West Indian fauna was derived from Mesoamerica. Eickwort (1988) suggested that the role of migration of Neotropical species via South America was not a strong component in making the West Indian halictine fauna. Considering the tribe Augochlorini alone, however, South America is probably the most significant source of migrants (see listing of taxa and their associations by Eickwort, 1988). *N. electra* apparently would also support such a relationship between South America and the West Indies for the augochlorines, while other source populations may be stronger contenders in creating the West Indian fauna for the sister tribe Halictini.

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LITERATURE CITED

Eickwort, G. C. 1969. A comparative morphological study and generic revision of the augochlorine bees (Hymenoptera: Halictidae). Univ. Kans. Sci. Bull. 48:325–524.

Eickwort, G. C. 1988. Distribution patterns and biology of West Indian sweat bees (Hymenoptera: Halictidae). Pages 231–253 *in:* J. K. Liebherr (ed.), Zoogeography of Caribbean Insects. Cornell Univ. Press, Ithaca, NY.

Engel, M. S. 1996. New augochlorine bees (Hymenoptera: Halictidae) in Dominican amber, with a brief review of fossil Halictidae. J. Kans. Ent. Soc., Suppl. 69:334–345.

Grimaldi, D. A. 1995. The age of Dominican amber. Pages 203–217 *in:* K. B. Anderson and J. C. Crelling (eds.), Amber, Resinite, and Fossil Resins. Am. Chem. Soc. Symp. Volume, Washington, D.C.

Lambert, J. B., J. S. Frye, and G. O. Poinar, Jr. 1985. Amber from the Dominican Republic: analysis by nuclear magnetic resonance spectroscopy. Archaeometry 27:43–51.

Michener, C. D. 1977. Nests and seasonal cycle of *Neocorynura pubescens* in Colombia (Hymenoptera: Halictidae). Rev. Biol. Trop. 25:39–41.

Michener, C. D. and R. B. Lange. 1958 Observations on the behavior of Brasilian halictid bees, III. Univ. Kans. Sci. Bull. 39:473–505.

Michener, C. D. and G. O. Poinar, Jr. 1996. The known bee fauna of the Dominican amber. J. Kans. Ent. Soc., Suppl. 69:(in press).

Michener, C. D., W. B. Kerfoot, and W. Ramírez B. 1966. Nests of *Neocorynura* in Costa Rica (Hymenoptera: Halictidae). J. Kans. Ent. Soc. 39:245–258.

Moure, J. S. and P. D. Hurd, Jr. 1987. An Annotated Catalog of the Halictid Bees of the Western Hemisphere (Hymenoptera: Halictidae). Smithson. Inst. Press, Washington, D.C.

Sakagami, S. F. and J. S. Moure. 1967. Additional observations on the nesting habits of some Brazilian halictine bees (Hymenoptera, Apoidea). Mushi 40:119–138.

Schremmer, F. 1979. Zum Nest-Aufbau der neuen neotropischen Furchenbienen-Art *Neocorynura colombiana* (Hymenoptera: Halictidae). Ent. Gen. 5:149–154.

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